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Office of Naval Research
Progress Report

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Name of Institution: San Diego State University Foundation
Title of Project: Content Effects in Mathematics Problem Solving
Principal Investigator: Sandra P. Marshall

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1. Activities:

Empirical Research. During this period, we continued our examination of the effects of familiarity and stereotype in mathematics word problem solving by further analyzing the data from two experiments described in a previous report. Our data base was derived from the problem solving and rating performance of 128 college students, who were asked to solve sixteen word problems and rate those, and other similar problems, according to their personal familiarity and according to their perception of sex-stereotypy of the situations described in the word problems. The results of these further analyses are described below.

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2. Findings:

Having previously found indication that familiarity and stereotype are distinguishable dimensions, we looked to the question of exploring these variables and examining how they affect problem solving success. Overall, males performed significantly better in solving the problems than did the females. Overall performance on the neutral-unfamiliar subtests was significantly lower than performance on the other subtests. When examining the general relationship between the rated characteristics and problem solving performance, significant results emerge. There were high correlations for both males and females when examining the relationship of familiarity and problem solving performance. However, non-significant correlations emerged for both males and females when examining the relationship between stereotype and problem solving performance.

Regression analyses of problem solving performance on structure (seed) and problem type (version) reveal that mathematical structure accounts for 84 percent of the variance. When we partialled out this structure effect, we found that for males, nine percent of the total variance was accounted for by problem type and for females, ten percent of the variance was accounted for by problem type.

Considering that males and females might selectively refrain from attempting to solve those problems which were less familiar to them or of opposite sex stereotype, we examined omissions not occurring at the end of the test. Results show that females omitted significantly more problems, overall, than did males, and that subjects of both sexes were more likely to omit the neutral-unfamiliar problems. However, there was no significant interaction between males and females over the individual problem types.

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3. Activities:

The results of this study were presented at the Annual Meeting of the American Educational Research Association and the Western Psychological Association Conference, both held in April 1990.

4. Projected Activities:

During the next quarter, we expect to conduct another experiment to further examine the effects of familiarity on problem solving. One hundred twenty-eight college students will be administered questionnaires on which they will be asked to rate sixty-four situations according to personal familiarity. These situations will be derived from the original word problems which were rated as to stereotype and familiarity by subjects in previous experiments. The word problems will be rewritten in a fashion which excludes all mathematical structure and will be presented to subjects as simple, descriptive statements on which to rate personal familiarity. As in previous experiments, subjects will also be asked to solve a subset of the original word problems.

Sandra P. Marshall

Principal Investigator

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